



Green Chemistry Program

Richard Engler

Office of Prevention, Pesticides, and
Toxic Substances

U.S. Environmental Protection Agency

US EPA Science Forum

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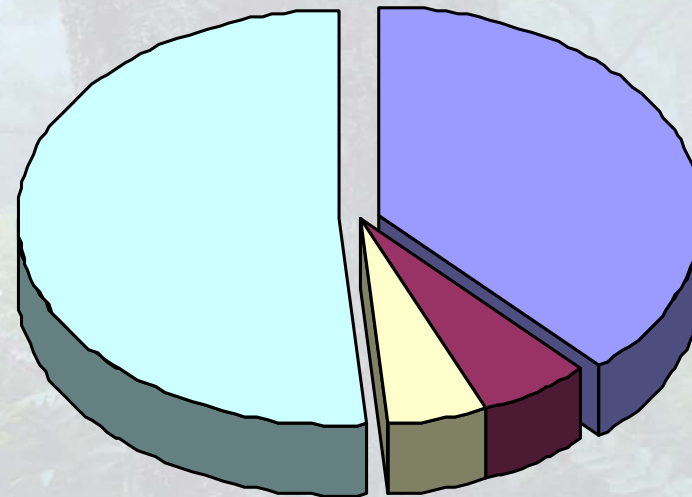
Chemical Releases

In 2002, 4.3 billion pounds of Toxics Release Inventory (TRI) chemicals were reported as released to the environment by TRI-reporting facilities.

2.2 billion lbs to land (51%)

1.6 billion
lbs to air
(38%)

TRI releases



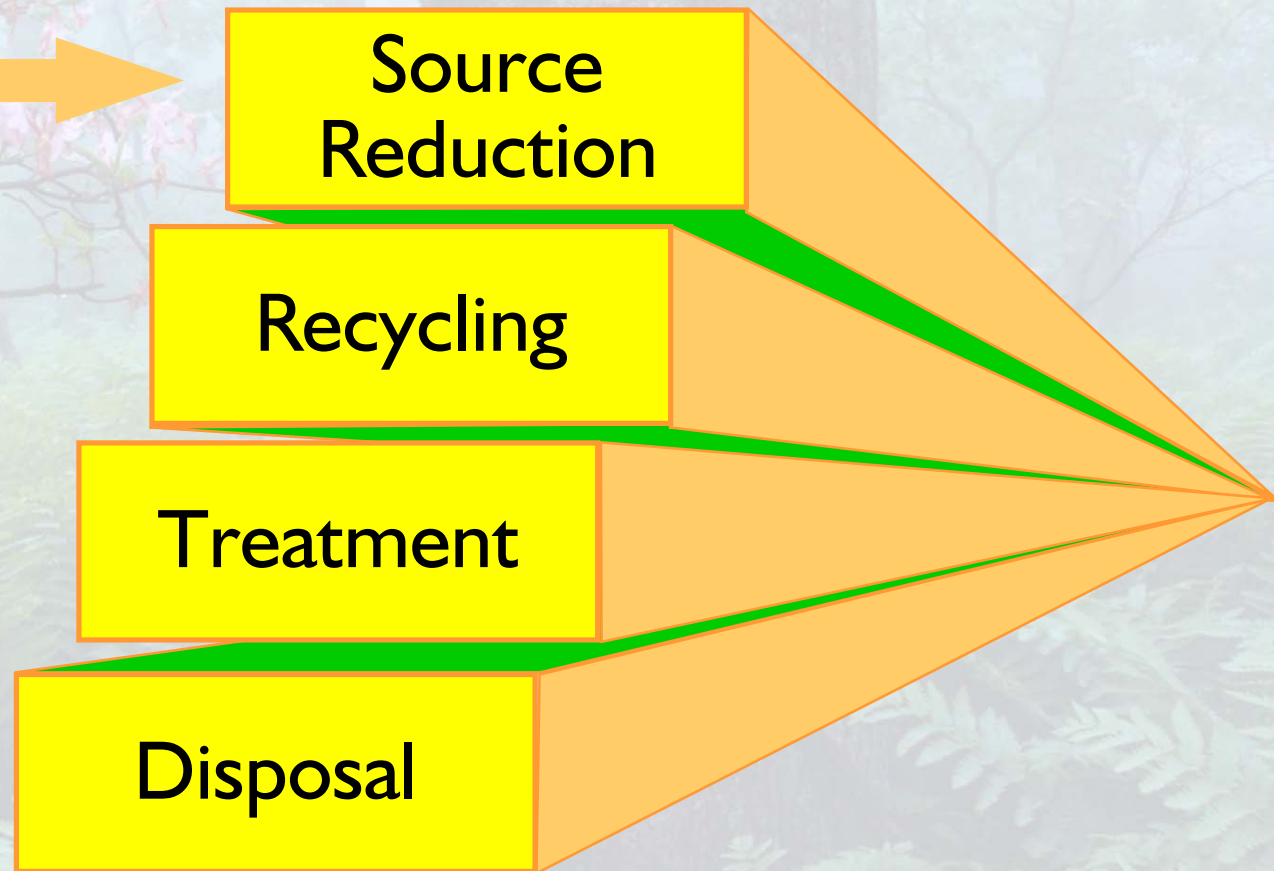
220 million
lbs to under-
ground
injection
(5%)

230 million lbs
to surface
water (5%)



Pollution Prevention Act: Risk Management Hierarchy

**Pollution
Prevention**





Reducing Risk: Two Approaches

Risk = f(Hazard, Exposure)

Reduce risk by

- reducing exposure
- reducing hazard.



Green Chemistry – Definition

Green Chemistry is the design of chemical products or processes to reduce or eliminate the use or generation of hazardous substances.



Principles of Green Chemistry

- **Prevent waste**
- **Maximize atom economy**
- **Design less hazardous syntheses**
- **Design safer chemical products**



Principles of Green Chemistry

- **Use safer solvents and reaction conditions**
- **Increase energy efficiency**
- **Use renewable feedstocks**
- **Avoid chemical derivatization**

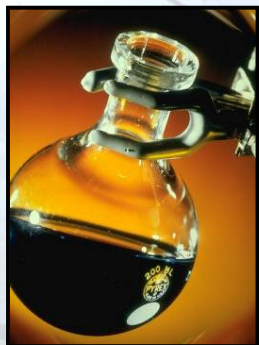


Principles of Green Chemistry

- **Use catalysts, not stoichiometric reagents.**
- **Design chemical products to degrade after use**
- **Analyze in real time to prevent pollution**
- **Minimize the potential for accidents**



Education



Research



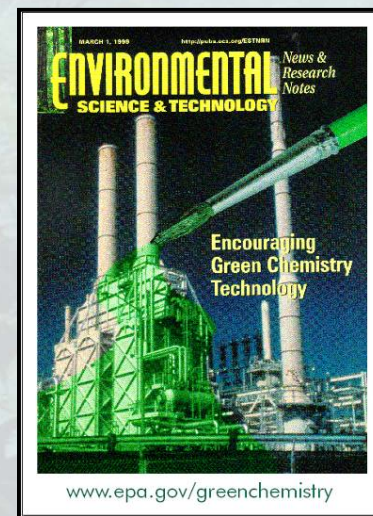
Awards



**International
Collaboration**

Green Chemistry Mission:

“To promote the research, development, and implementation of innovative chemical technologies that reduce or eliminate the use or generation of hazardous substances from chemical manufacture and use.”



Outreach



Technology Attrition





Demonstrated Benefits



Presidential Green Chemistry Challenge Awards demonstrate scientific, economic, environmental benefits of green chemistry technologies.





Measurable Results



The 46 award-winning technologies prevent the use and generation of 120 million pounds and 2.2 million gallons of hazardous chemicals and save 55 million gallons of water each year.



<http://www.epa.gov/greenchemistry>



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To promote innovative chemical technologies that reduce or eliminate the use or generation of hazardous substances in the design, manufacture, and use of chemical products.



Green Chemistry

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>> Highlights <<

- ▶ [2004 Presidential Green Chemistry Challenge Award Winners](#)
- ▶ [2nd International Conference on Green & Sustainable Chemistry / 9th Annual GC&E Conference](#) (June 2005, Washington, DC)
- ▶ [Presidential Green Chemistry Challenge](#)
- ▶ [12 Principles of Green Chemistry](#)

[Green Chemistry Links](#)

[Green Chemistry Documents](#)

Richard Engler (202-564-8587)